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Edison United Mfg Co

BID AND SPECIFICATION

FOR THE FURNISHING AND ERECTION OF AN

EDISON INCANDESCENT ELECTRIC LIGHT PLANT

— FOR THE —

ALLEGHENY COUNTY COURT HOUSE AND JAIL,
PITTSBURGH, PA.

— FROM —

STERN & SILVERMAN,

EXCELSIOR BUILDING, PITTSBURGH, PA.

GENERAL AGENTS OF THE

EDISON UNITED MANUFACTURING CO.

NEW YORK, N. Y.

To CHARLES D. AUSTIN, Esq.,

SUPERVISING ARCHITECT,

PITTSBURGH, PA.

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CHARLES D. AUSTIN, ESQ.,

Supervising Architect, Allegheny County Court House and Jail,
CORNER ROSS AND FIFTH AVENUE, PITTSBURGH, PENNSYLVANIA.

DEAR SIR:

In accordance with your invitation letter of the 23d inst., we herewith respectfully submit our proposition and specification for the furnishing and erection of a complete electric light plant for the above-named buildings to consist of engines, dynamos, lamps, sockets, regulators, ampèremeters, candle-power indicators, and all other parts necessary to make the same a complete working plant, from and including the steam engines to the tips of the lamps, with the exception of fixtures, and to do the same in strict accordance with the general specifications issued by you, and also consistent with the rules and regulations of the New York Board of Fire Underwriters.

For the purpose of making this specification as intelligible as possible, we will divide the same into two parts, namely: that pertaining to the Court House shall be known as No. 1, and specification for the lighting of the Jail shall be considered separately under head of No. 2.

We will agree to furnish all the material, machinery and apparatus below specified, and erect the same in the following manner:

SPECIFICATION No. 1.

FOR LIGHTING COURT HOUSE.

PLAN.

We herewith submit a drawing, showing a general floor plan of that portion of the basement intended to be used as an engine and dynamo room. In the same we have marked our contemplated and proposed method of placing the engines and dynamos. In this arrangement we have sought to get the greatest convenience with occupying the least possible space.

EXPLANATION OF PLAN.

In the plan we have shown three engines, of any of the makes specified fully later on in this proposal, and have marked the same respectively, No. 1, No. 2, and No. 3, and by reference to the same it will be seen they are placed in a line parallel with the greatest side of the room. We have also shown upon this plan four dynamo electric machines, A, B, C, and D, and the position of the various machines mentioned is such that the distance between centres of pulleys is the same throughout. For instance: Centre of dynamo pulleys A and B are equi-distant from centres of pulleys of engines No. 1 and No. 2, and centres of pulleys of dynamos C and D are equi-distant from centres of engine pulleys No. 2 and No. 3. By this arrangement it is clear to be seen that all belts are exactly the same in length, and can therefore

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readily be slipped from one machine to another, which is a very convenient method of interchanging the engines and dynamos. For instance: engine No. 1 can drive either dynamo A or B, or both. Engine No. 2 can operate either one or both of dynamos in any pair, the belts of engine No. 2 can operate any of the four machines, and engine No. 3 will run dynamos C and D. In this manner we are enabled to have a constant run and still give all of the machines and engines their required and necessary relief.

**STATION
EQUIPMENT.**

In the engine room, shown upon the plan, we will place three automatic steam engines, each of power and speed sufficient to operate one-half of all the lamps in the Court House, plus the necessary power for the operation of the fans or blowers, the same to be determined in the manner described in your general specification.

SWITCH-BOARD.

We will also place in the engine room a general switch-board. The same shall be made of good, hard and well seasoned wood, and shall contain, in addition to a steam gauge for indicating the steam pressure at the engine room, all of the necessary apparatus for controlling, indicating and regulating the system.

**BUS WIRES.
AMPÈREMETER.**

From the dynamos we will carry the necessary stout copper bars through ampèremeters (one for each machine), and terminate the same upon the board, connecting them to two larger wires or rods called "bus" wires and these will extend across the full length of switch-board, parallel to each other. From these through the proper safety catches and switches, all to be double pole as specified fully later on, we will run proper size copper conductors through feeder equalizers to each quarter of the building and there connect with the rising mains in each quarter of the building for the lighting of that quarter.

**CANDLE-POWER
INDICATOR.**

We will also place upon the switch-board, the candle-power indicators, which are intended as a means of enabling your operator or electrician to regulate the supply of current according to the demand. Or, in plainer words, to enable him to keep his lamps burning at their nominal and rated candle-power. In addition to their indicating at all times just what candle-power the illumination of the lamps on any quarter really are, it also has two signals which can be seen from any part of the station. They operate in the following manner: The needles upon the instruments indicate at all times whether the lamps are exactly normal; should they vary two or more candles below this (or any margin desired, they are capable of being adjusted) it shows a blue light. Should the lamps go a like amount above their rated candle-power, a red light will be displayed, and should this not be noticed by the electrician, as might be the case if he happened to be occupied, with his back turned, a bell is also sounded, which makes it doubly sure that his attention will be called. This is a very essential feature, for the reason that the life of

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the lamps and the economy of the system as a consequence, is dependent upon how constant in candle-power the lamps are maintained.

**FEEDER EQUAL-
IZERS.**

We will also place upon this station, or switch-board, the handles, levers or wheels of the feeder equalizers; these will be firmly and mechanically attached to the shafts which continue to the equalizers placed in the rear of this board.

VOLTMETERS.

We will also place upon this board the four voltmeters, side by side, so that, by a glance at them and a movement of the equalizers, the same, or any pressure desired, can be had on all of the different feeders.

AMPÈREMETERS.

We will also place in the station or engine room, in some convenient position, four ampèremeters (one for each machine.) They shall be of such construction and design as will multiply or enlarge their real movement, and thus enable the operator at a distance to make correct readings.

**FIELD
CONTROLLERS.**

We will also provide four hand regulators for controlling the fields of the dynamo machines, by which the current generated from each machine is controlled, and in this manner, by means of the ampèremeters, the operator can tell whether the machines have all an equal portion of the load; and the load can be shifted from one machine, or pair of machines, to the other, in the following manner:

**SHIFTING THE
LOAD
TO DIFFERENT
MACHINES.**

One pair of machines is running. We start another engine. After this is done, we close the circuit to the field magnets of the second pair of dynamos through the same resistance as is upon those doing the lighting. This saturates the iron to a like amount of magnetism. When this is accomplished, we close, by means of a switch, the circuit to the armature, when we will find that both sets of ampèremeters represent the same amount of current on each. This enables us to determine that both sets of dynamos are equal in pressure. We then turn the hand regulator of the first pair of machines until sufficient resistance has been entered to gradually and entirely throw the load upon the second pair of machines, when the circuit of the first pair is opened and the engine is stopped, letting the second having the entire load, and by this means the change is made without a flicker in the lights.

**SPEED
INDICATORS.**

We will also provide and erect, in a neat manner over every engine, a permanent steam engine speed indicator, which will at any and all times enable you at a glance to see exactly what speed the engine is making, as it is upon the direct reading principle.

**PROVISIONS FOR
STEAM ENGINE
INDICATORS.**

Upon all of the engines we will make the necessary provisions for readily applying the steam indicators, at either or both ends of the engine cylinders. We will also make such arrangements as will be required for giving the necessary reciprocating movement to the indicators.

**STANDARD
PHOTOMETERS.**

We will also place in the engine room or some other location convenient thereto (to be decided upon by you), a standard photometer,

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with proper connections and other parts necessary to enable the correct measurement of candle-power.

**STANDARD
AMMETER AND
VOLTMETER.**

We will also furnish and provide an Ayrton & Perry's standard ammeter and voltmeter, in neatly finished hard wood cases, and also two pairs of Tabor steam-engine indicators, complete with their full complement of springs.

**BELT
TIGHTENERS.**

The dynamos shall all be mounted upon good and substantially built base frames, and these shall be provided with rails and adjusting screws, for the purpose of enabling the taking up of any slack in the belt without the necessity of cutting the same.

**DYNAMO
FOUNDATIONS.**

We will build foundations for the dynamos of brick and cement, of such height as will let the bottom of dynamos be at least six inches from the floor line. We will also drill and dovetail the rock below to the depth of eighteen inches, for the reception of the bolts which are to be used for the fastening of the dynamo base frames.

**ENGINE
FOUNDATIONS.**

We will also build foundations for the engines of brick and cement, in the same manner as was specified for the dynamos, extending them to that height, as will let the pulleys or wheels of engines be about five or six inches above the floor line.

ENGINES.

We will also provide and erect upon said foundations three steam engines of the following description:

In consequence of the different manner in which this work can be done, namely, in so far as the engines alone are concerned, such as putting in smaller machines, and getting the necessary power out of them by speeding up the same, and thus making a great difference in price, we have seen fit to submit two entirely separate and distinct engine specifications. One, as we deem it necessary to insure a perfect steam plant, marked specification A; and the other, as many of our competitors frequently figure when brought in close competition, marked B.

To consist of—

Three engines,
Pipe fittings,
Pipe covering,
Engine foundations, and all necessary miscellaneous piping.

SPECIFICATION FOR STEAM PLANT A.

ENGINES.

There are to be three (3) Armington & Sims' Automatic Cut-Off Engines, of the latest pattern and design, with double disc crank, and to be of the best material and workmanship throughout, same as accompanying photograph, marked Exhibit F. These engines with 80 pounds initial steam pressure, cutting off at one-fourth length of stroke, and running 275 revolutions shall each develop 113 horse-power.

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Cylinders to be *14 inches diameter* by *13 inches stroke*. Same to be jacketed with iron lags and packed with mineral wool.

There will be two (2) fly wheels to each engine, which serve also as driving pulleys, to be of such diameter and face as best suited to the work to be done, and of ample weight to secure uniformity of motion. Each engine will have one stop valve fitted to cylinder, one automatic sight-feed lubricator, full set of graduated sight-feed oil cups, all necessary wrenches, valves and drain pipes fitted to steam chest and ends of cylinder. Engines will also be fitted with oil guards to prevent oil being thrown about engine room from moving parts of engines. These engines, in order to conform with your specifications, have been figured as follows: "To find the horse-power required to run 2,000 lights (16 candle-power and 12 lights to the horse-power) and 50 horse-power additional for fans."

$$\frac{166 \text{ HP. for 2,000 lights} + 50 \text{ HP.}}{2} = \frac{216}{2} = 108 \text{ HP.}$$

One hundred and eight (108) horse-power being the power required for each engine, the engines named showing 113 horse-power each, will give you an excess of 5 horse-power under extreme load at $\frac{1}{4}$ cut-off and without change of speed.

All steam or exhaust pipes shall be heavy wrought-iron pipe. No galvanized spiral piping to be used. Steam feed piping from boilers to be led over to engine room by the building contractor, he is also to provide exhaust piping from engine room to its proper outlet. All drips from engines and main steam pipe, to be led to a main line drip pipe $1\frac{1}{2}$ inches diameter, which is to be led to the sewer or drip cistern as may be provided. Main drip pipe to be properly supplied with valves.

Main steam-delivery pipe to engine room will be connected with a cast-iron steam drum, from which, and attached to, three cast-iron nozzles ($4\frac{1}{2}$ inches diameter) on the drum, the three $4\frac{1}{2}$ -inch steam supply pipes for engines are to be led, each of which will be supplied with an auxiliary valve to shut off steam in case of accident to piping. Each engine shall have a 6-inch gate valve attached to its exhaust Y to prevent exhaust backing up into any engine when it may be shut down.

The 6-inch exhaust from each engine shall be led to a main cast-iron exhaust drum and connected thereto by three 6-inch nozzles, this exhaust drum properly dripped to carry off condensation, shall be connected with the exhaust led to engine room by building contractor.

VALVES.

All cut-off valves of a size larger than 3 inches area in opening will be Gate Valves. Valves of a smaller size are to be of the Jenkins' type with removable discs.

The entire system of steam and exhaust piping shall be absolutely tight and free from leakage under a steam pressure of 150 pounds; Jenkins' packing to be used on all joints requiring packing.

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The main exhaust pipes from engines should be laid in a trench below floor of engine room, so that any repairs necessary in the future can be made without injury to floor, trench to be provided by building contractor.

**PIPE FELTING OR
COVERING.**

All exposed pipes having live steam, are to be covered with the "Chalmers-Spence Sectional Asbestos Covering," or its equal.

MASON WORK.

All bricks will be of the best quality, burned hard entirely through, free from cracks and bulges, and no bats or broken bricks used. Outside courses above floor line will be of pressed brick, all points being neatly pointed. Brick work to be well bonded together with headers every third course.

All mortar used for foundations will be made with clean sharp sand and Portland cement. If foundation boxes are used under engines, they (the boxes) are to be bedded in pure cement mortar on brick work and boxes filled in solid with concrete. This forms a very strong, substantial engine base.

If engine foundations are started upon bed rock, then the bolts will be firmly fixed in holes in rock, by drilling each hole not less than 12 inches deep, having the bolt ends split and fitted with iron wedges; bolts to be driven down firmly so as to spread wedges and fix bolts substantially in position.

If the engine foundations are not started upon bed rock, they will be started on a bed of concrete not less than 12 inches thick, upon which foundations will be constructed. When the steam plant is entirely completed, we will operate it for 10 days, furnishing power at such times as we may be directed.

These specifications are intended to cover in its general items all the important work of the erection of the steam plant as named, comprising the erection of engines set up complete, drip piping and all mason work, labor, handling, setting up, hauling, starting and running for ten (10) days. Each engine will be provided with a Tabor indicator, and the proper rig for its use.

Each engine is also to have attached, by means of belt, to its shaft, a Schaeffer and Budenberg "Tachometer," or speed indicator.

We guarantee that all work shall be first-class throughout, and that engines shall be well and strongly built, the best material being used throughout their construction. Should any defects show through faulty construction or material, such parts will be renewed without cost, and that the regulation shall be such that they will show you an absolutely steady light under a varying load. We further guarantee that the loss of power from friction shall be less than one-tenth that of the power developed by the engine. These engines are capable, under a higher pressure, of giving a very much greater power, and are also capable of making long and continuous runs. Four engines, the size named, have been running for the

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last five years in the Edison Company's Pearl Street Station, New York, doing 160 horse-power work, frequently making a straight run night and day for a week.

The engines will be tested before leaving the shop to a power 25 per cent. above their rating, all parts being thoroughly tested, so that perfect running engines are insured; besides which all work shall undergo a 10 days' test before the architect, in such a manner as he may elect, either as to duration, economy, close regulation, or perfection of workmanship.

BELTS.

We will also furnish and provide four belts for connections between the engine and dynamo machines. They shall be of the best quality of double belting, and shall practically be seamless; the joint or splicing being made by beveling or trimming the ends to a mitre, and cementing and riveting the seam together.

PIPING.

We will also agree to provide and erect all the necessary piping, valves and pipe covering for all steam connections to and from the engines. This, however, is for only the connection to and between the live and exhaust steam pipes, brought to entrance of engine room by you and the engines. And also all the drip and drain connections.

SPECIFICATIONS FOR STEAM PLANT B.

Under this head we will agree to furnish a steam plant consisting of everything above specified, erected of the quality and in the manner as stated under specification A, the only difference being in the size of the engines, which shall have cylinders 13 inches in diameter and a stroke of 12 inches. They will be adjusted or set to run at 300 revolutions per minute, and with 90 pounds steam pressure will satisfactorily develop 112 horse-power each, at $\frac{1}{4}$ cut-off.

While these engines will do the work, we do not recommend them, having simply included them so as to meet conditions that our competitors often make for us.

DYNAMOS.

We will also agree to furnish and erect upon foundations above specified four (4) Edison standard dynamo electric machines, each having a capacity equal to operate five hundred (500) Edison Standard 16 candle-power lamps, complete with brushes, lubricators, etc.

In short, we will agree not only to furnish and erect all the machinery and apparatus above-named, but everything else that may be necessary to generate and control the necessary current to operate the number of lamps desired (2,000 16 candle-power lamps dynamo capacity), but also sufficient standard apparatus to enable you to make calculations for the purpose of ascertaining how economically the same is done, as well as indicating at all times whether the guarantees we make are being made good.

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MOTORS.

We will furnish and erect two Sprague motors of sufficient size to satisfactorily operate the ventilating fans or blowers in the basement, providing the same shall not exceed 40 horse-power each.

MOTOR FOUNDATIONS.

We shall place the motors upon foundations of brick and cement in precisely the same manner as was specified in the case of engine and dynamo foundations.

WIRING.**MAIN FEEDERS.**

From the "Bus" wires in the station or engine room we will run six (6) sets of feeders as follows:

No. 1 to Jail.

No. 2 to Northeast corner of Court House.

No. 3 to Northwest corner of Court House.

No. 4 to Southeast corner of Court House.

No. 5 to Southwest corner of Court House.

No. 6 to fans or blowers.

They shall be of suitable size copper, as will not alone have a safe ampère carrying capacity, but will convey the necessary energy at an efficiency of 95 per cent.

The five (5) feeders, respectively Nos. 1, 2, 3, 4 and 5, shall be provided with feeder equalizers, positioned upon the station switch-board, as was specified under heading "Feeder Equalizers." And there shall also be placed across the terminals of feeder equalizer No. 1 a short circuiting switch for the purpose of cutting out the same when current is being passed through this feeder from the Jail dynamo, later specified.

FEEDER No. 1.

Feeder No. 1 is intended to convey current to and from the Jail, and for this reason shall be the same size throughout, so as to have a uniform drop of potential or pressure, regardless of its being used to either feed the Court House or Jail.

PRESENT WIRING IN COURT HOUSE AND ITS ACCEPTANCE.

At the elevator shafts in the four different quarters of the building, we will attach our main feeders to the rising mains already there, and by applying the appropriate sized double-pole switches and safety catches, connect to the present wiring system, which we do hereby accept, and under which we later make our guarantees.

MAIN FLOOR. SAFETY CATCH.

At every floor we will make connection to the rising main and floor service, agreeing to use a double-pole safety catch, of suitable size and design, covered entirely by a neat iron box, for the purpose of concealing all of the parts of the same.

DISTRIBUTING POINT, OR TABLEAUX.

Where the service of each quarter of every floor meets the different distributing mains of that section, or where the distributing mains converge, we will place a board arranged as the one herewith submitted and marked "Exhibit B," encase the same in a neat wood box of such design as will be approved by you, and provide the same with lock and key.

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SERVICE CONNECTION.

The service will pass through a double-pole main safety catch and will then proceed to all the branch safety catches. To these mains, and through the double-pole switches and safety catches, all the sub-mains will be connected.

PLUGS, OR SAFETY DEVICES

In the branch cut-outs neat glass safety plugs will be inserted of such size as will permit the safe carrying of just enough current to feed the exact number of lamps upon each main.

SWITCHES.

All switches so used shall be Edison standard double pole, and shall be either nickel-plated or polished brass, as per sample submitted, and mounted upon board, forming part of "Exhibit B."

These switches are so constructed that they have four different points, at which the circuit is broken, and for this reason there is no dangerous or injurious sparking effects. Beside this, the switch opens or breaks both poles of the circuit, so there is no danger or possibility of not shutting off the current, whether there be a leak or not.

CUT-OUTS.

All safety catches or cut-outs for 125 lights, or less, shall be made of porcelain and shall be double pole the same as those submitted and marked "Exhibit C." These porcelain cut-outs are found to be the only means of preventing the great danger of short circuits in large electric light plants like this, because of the non-absorbing quality of porcelain, a point to which too much attention cannot be given, as any dampness will affect the insulating properties of the system if wood were used, as has been commonly the case.

WALL CUT-OUT AND ROOM SWITCHES

In the rooms where the distributing main enters, we will place double-pole safety catches, with plugs, as above specified, and as per the sample submitted, for the purpose of controlling the lights in each room.

PRESSURE WIRES

From a distributing point or tableau in each quarter of the building, we will run smaller wires back to the pressure and candle-power indicators mounted on the switch-board in the station or engine room, as above specified.

SOCKETS.

We will also furnish 2,150 Edison standard key sockets, to be made of polished brass and hard rubber rings, the same as sample submitted, and marked "Exhibit D."

LAMPS.

We will also agree to furnish 2,150 Edison standard 16 candle-power incandescent electric lamps.

CONNECTION OF FIXTURES.

We will agree to electrically connect any and all fixtures furnished by you supplying the necessary double-pole safety fuses.

FEEDER WIRES.

Wires used for the feeders or for connection between "Bus" wires and risers shall be either "Okonite," Grimshaw or lead covered. We prefer to use the first named, and submit samples of the "Okonite," marked "Exhibit E." All joints to be soldered, and taped with "Okonite" water-proof tape.

All work to be installed in accordance with the rules and regulations of the National Board of Fire Underwriters of New York.

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**THREE-WIRE
SYSTEM.**

We will agree to run extra feeders and supply the additional necessary apparatus to change the plant from a two-wire system to the Edison three-wire system by a simple movement of switches on the dynamo. The benefit or advantage of this is a smaller drop upon the lines or one-half the loss occasioned by a two-wire system.

SPECIFICATION No. 2.**FOR LIGHTING OF JAIL.****STATION EQUIP-
MENTS.**

In the engine room we will place one Armington & Sims automatic steam engine of thirty horse-power. We will build the necessary foundation for the same, and make all necessary connections between it and the main steam and exhaust pipes located in the present boiler room.

SWITCH-BOARD.

We will also place in the engine room a general switch-board. The same shall be made of good, hard and well-seasoned wood, and shall contain all of the necessary apparatus for controlling, indicating and regulating the system of lighting for the Jail.

**"BUS" WIRES
AND
AMPEREMETERS.**

From the dynamo we will carry the necessary stout copper bars through an ampèremeter, and connect them to two larger wires, called "Bus" wires, running parallel to each other and across the board. From these, through the double-pole safety catches and switches placed upon the board, we will run the necessary feeders to the office of the Jail, and also the gallery or balcony or guard room of the Jail.

**CANDLE POWER
INDICATOR.**

We will also place upon the switch-board candle-power indicator, which will enable your operator or electrician to keep the lamps burning at their nominal and rated candle-power. This indicator will be provided with colored signals and alarm bell, the same as was specified for the Court House.

**FIELD
CONTROLLERS.**

We will also provide a hand regulator for controlling the field of the dynamo machine, upon which the amount of current generated is dependent.

**SPEED
INDICATOR.**

We will also provide and erect in a neat manner over the engine a Schaeffer and Budenberg "Tachometer," that will at all times enable you, at a glance, to know how many revolutions the engine is making.

**PROVISION FOR
STEAM-ENGINE
INDICATORS.**

Upon the engine we will make the necessary provision for readily applying the steam indicators at either or both ends of the engine cylinder. We will also provide a full rig for making cards of the engine.

**ENGINE AND
DYNAMO
FOUNDATIONS.**

We will agree to build foundations of brick and cement for both the engine and dynamo, in such manner as will let the bottom of the dynamo at least 6 inches from the floor line, and the engine pulley to be about the same distance above the floor line, the detail of which will be in every way the same as was specified for the Court House.

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ENGINE.

We will agree to furnish one Armington & Sims engine, with double disc crank, and to be of the best material and workmanship throughout.

This engine, with 80 pounds initial steam pressure, cut off at one-fourth, and running 325 revolutions per minute, shall develop 30 horsepower.

Cylinder of engine shall be 8 inches diameter by 9 inches stroke. Same to be jacketed with iron lags and packed with mineral wool.

There will be two fly wheels, which serve also as driving pulleys, of ample weight, to secure uniformity of motion.

There will be one stop valve fitted to cylinder; one automatic sight-feeder lubricator; full set of graduating oil cups; all the necessary wrenches; valves and drain pipes fitted to steam chest and ends of cylinder.

General specification of the engine, and its setting to be the same as that given for the larger ones for the Court House.

DYNAMO.

We will agree to furnish and set upon foundation, provided with base frame and belt-tightening device for the purpose of taking up any slack in the belt without the necessity of cutting the same, one Edison standard dynamo machine, with a nominal capacity for operating 300 Edison standard 16 candle-power lamps.

BELT.

We will furnish the necessary belting between the engine and dynamo. The same to be double-thick and of the best quality.

WIRING.

All wire to be used in the Jail shall be either Okonite, Grimshaw or the Standard Underground Cable Company's lead-covered. All splices shall be made with good solder and covered with Okonite water-proof tape. All wires to be concealed in neat wood mouldings, and protected throughout the building in such manner as to make interference with them impossible.

FEEDERS.

From the station board in the engine room of the Jail we will carry, through proper safety catches and switches, three entirely separate and distinct feeders; one, for the lighting of the Jail proper, which shall be carried to the office and guard room of the Jail, at which points gangs of switches shall be located for controlling the lights in the wards proper, to be specified fully later on; another feeder will proceed to the Warden's residence for the lighting thereof, and the third feeder shall be used as a means of lighting the hospital and office portion of the Jail.

**ARRANGEMENT
OF SWITCHES.**

The first-named feeder at its terminal will sub-divide into two parts or legs, for the purpose of giving current to the switches located in the guard room of the Jail and also the office. And the circuits and switches will be so arranged that the office switches will control those in the guard-room of the Jail and also the office. And the circuits and switches will be so arranged that the office switches will control those in the guard room, so that no lights can be turned on at the guard room unless

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provision is made for the same by the person in charge of the office. In addition to this, provision will be made in the office to enable the lighting up of the Jail at that point in the event of something happening to the guard-room switches, either accidentally or intentionally. The switches in number shall be sufficient to enable the controlling of the lights in separate gangs of at least three vertical tiers each.

**EFFICIENCY OF
WIRING.**

All feeders, mains and sub-mains in the Jail shall not alone have a safe ampère-carrying capacity, but shall be of such size as shall have an electrical efficiency of 95 per cent.

SWITCHES.

All switches and safety catches shall be double pole and of appropriate size, and shall be placed on all feeders, mains, sub-mains and the fixtures themselves.

**INSULATING
JOINTS.**

All fixtures to which incandescent lamps are to be attached, shall be provided with an Edison standard insulating joint.

**COMBINATION
FIXTURES.**

Upon all fixtures intended to be used for both gas and electric light, we will supply the necessary fittings, of neat and ornamental design, necessary to enable use of same for both gas and electric light. And in Warden's residence we will have the fixtures changed to a combination of neat and ornamental design.

**WIRING
WARDEN'S
RESIDENCE.**

All the wires in the Warden's residence are to be concealed, as far as possible so to do. Following the same course from the Jail, through the basement and under the floors, as the present gas-piping system.

SIGNAL SYSTEM.

We will also provide a system of signal bells and signals between Court House and Jail engine rooms, for the purpose of enabling the indication of a shut-down on either end.

GUARANTEES.

We make the following guarantees:

LAMPS.

That when the lamps are not driven beyond their nominal or rated candle-power, they will show an average life of not less than six hundred (600) burning hours.

That the efficiency of same shall be twelve (12) lamps of sixteen (16) candle-power each (or their equivalent in any other candle-power) to the horse-power.

ENGINES.

That with eighty (80) pounds steam pressure at the engine room, an efficiency of at least ninety (90) per cent. shall be maintained; *i. e.*, that the loss due to friction shall not be greater than one-tenth ($\frac{1}{10}$) of the load.

**GENERAL
GUARANTEE.**

We will also guarantee that all the apparatus so installed shall be electrically and mechanically perfect; and should any imperfect parts show themselves within one year's time, as a result of poor workmanship or material, we will make good the same at our expense.

In short, we will guarantee to furnish and erect an electric light plant for both the Court House and Jail, as above specified, in a first-class

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and workman-like manner, and in accordance with the rules and regulations of the National Board of Fire Underwriters, of New York, and also consistent with your general specification; and that the same shall be complete in every regard; and that it shall be complete in every particular, from the connection to your steam pipes to the tips of the lamps, including everything except the fixtures in the Court House. And any omission from these specifications necessary to make the same a complete and working plant, shall be furnished at our expense.

It is understood and agreed that the plant be tested, as mentioned in your general specification; as well as our keeping a man in charge, and making the necessary runs of same, as called for by you.

SUPPLEMENTAL.

We herewith attach to, as forming part of our bid and specification, separate specification for different makes of engines. They are as follows:

TAYLOR—"BECK'S" PATENT ENGINES.

We propose to furnish you the following-described engines, erected and started in successful operation, at location designated and conditions named below, viz.:

COURT-HOUSE ENGINES.

Three (3) of Beck's patent automatic cut-off engines, each engine having heavy cast-iron sub-base plate, combining main engine frame and out-board pillar block, making the engine self-contained.

SIZE, STYLE, SIZE WHEELS.

Each engine having cylinder $14\frac{1}{2}$ -inch bore and 18-inch stroke. Hammered steel shaft, $6\frac{1}{2}$ -inch diameter by $6\frac{1}{2}$ feet long. Main bearing, $6\frac{1}{2}$ -inch diameter, $14\frac{1}{2}$ -inch long. Outer pillar-block, with bearing, $6\frac{1}{2}$ -inch diameter, with bearing $14\frac{1}{2}$ inches long. With two (2) band wheels, each 72-inch diameter, 13-inch face, turned and balanced true.

FIXTURES.

Also, each engine provided with the following features:

Two (2) continuous sight-feed cylinder lubricators (nickel-plated); a full set of nickel-plated continuous graduated sight-feed oilers; automatic relief valves, for condensation in cylinders; a full set of wrenches, for adjusting every part of engine; foundation rods and anchor plates; oil can and full set of oil drip pans, all of brass, covering the complete engine, beginning at opening on valve chest for throttle valve, and ending at opening on valve chest for escape pipe.

ERECTION.

We propose to deliver these engines in basement of the Allegheny County Court House, set the same up in a first-class manner, making foundations of hard brick and cement, with the anchor rods securely leaded to rock under the foundation, furnish all steam pipe, exhaust pipe

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and drain pipes, and connecting same with the large receiving pipes now in the building. All live steam pipe to be covered with the best sectional covering. Also, furnish all necessary valves, angle valves of Jenkins' Brothers or Russell make, and Chapman's or Ludlow's gate valves.

HORSE-POWER.

Above engines will each develop 120 indicated horse-power at 200 revolutions per minute, on 80 pounds steam pressure at engines cutting off at $\frac{1}{4}$ stroke.

Also,

ENGINE FOR JAIL.

We propose to furnish you one Beck's patent automatic cut-off engine, having cylinder $8\frac{1}{2}$ -inch bore, 10-inch stroke; hammered steel shaft $3\frac{7}{8}$ -inch diameter; one band wheel 48-inch diameter, 8-inch face, turned and balanced true, and the engine provided with one $2\frac{1}{2}$ -inch throttle. Two automatic sight-feed cylinder lubricators (nickel-plated), a full set of sight-feed nickel-plated graduated oilers, a full set of wrenches to adjust every part of engine, a full set of foundation rods and anchor plates; also oil can and full set of drip pans, all of brass.

FIXTURES.**ERECTION.**

We propose to deliver this engine in the building of the Allegheny County Jail, set the same up in first-class manner, with hard brick and cement foundation, and start same in successful operation, furnishing all necessary pipes to connect engine with receiving pipe from boiler, and exhaust pipe and drain pipes. Steam pipe to be covered with Chalmer-Spence sectional covering or other equally as good.

HORSE-POWER.

Above engine will develop 35 indicated horse-power, at 310 revolutions per minute, cutting off at $\frac{1}{4}$ stroke.

We propose to furnish the above engines and fixtures, set up and started in successful operation, and run by us on a test for a period of ten (10) days.

GUARANTEE.

We guarantee the material and workmanship in these engines to be of the best and strictly first-class, and that the engines shall work as economically, run as smoothly, with as little variation under the varying conditions of steam pressure and load, as any single valve automatic engine built.

We also guarantee to make good any damage occurring to the engines during the period of one year, from defect in material or workmanship.

IDE ENGINES.**ENGINES AND INDICATORS.**

We respectfully submit to you the following proposition for four Ide automatic engines, for the Allegheny County Court House and Jail at Pittsburgh, Pa., delivered and set up, including all the pipe connections for steam and exhaust inside of engine room.

We will furnish three Ide engines for the Court House, each with cylinder 15-inch bore by 18-inch stroke, running 214 revolutions per

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minute. Each engine to be provided with two band-wheel pulleys 78-inch diameter by 11-inch face. With each engine is to be furnished a Schaeffer & Budenberg "Tachometer," with a cast-iron stand, so as to belt direct from engine shaft to tachometer, showing the speed of engines at all times. To each engine would be attached permanently connections and fixtures for steam-engine indicators. These appliances are gotten up in good style and well finished. We will also furnish two Crosby steam-engine indicators.

We will deliver the engines and direct the same, securing the anchor rods to the rock foundation and providing a brick foundation above floor level, with pressed brick surface.

**ENGINE
FOR
JAIL
AND
INDICATORS.**

We will also furnish one Ide engine, 8-inch bore by 10-inch stroke, on self-contained base, with band-wheel pulley 54-inch diameter by 9-inch face, running 312 revolutions per minute, delivered and set up, including one Schaeffer & Budenberg "Tachometer" and indicator fixtures. The above engine to be located in the Jail. The pipe connections all made for steam and exhaust inside of the engine room, as well as drip pipes from cylinder for the several engines mentioned.

To each of the three engines for the Court House, we would furnish a top cast-iron foundation plate, forming a shallow pan, to catch all drippings and protect foundation. The engines to be in every respect thoroughly first-class; all shafting of steel, and well finished throughout. The cylinders to be covered with a cast-iron jacket, and the space between this jacket and cylinder to be filled in with mineral wool or asbestos. All oilers to be sight-feed and nickel-plated; also, nickel-plated double-tube cylinder lubricators for each engine.

GUARANTEES.

Any parts defective on account of material and workmanship will be replaced inside of a year, without charge. We would also guarantee a regulation not exceeding $1\frac{1}{2}$ per cent. in variation of speed, running light or loaded; and that, with 80 pounds pressure in engine room, an efficiency of at least 90 per cent. shall be maintained. The centre engine of the three engines for the Court House to be so arranged as to belt backward or forward.

Respectfully submitted,

THE EDISON UNITED MANUFACTURING COMPANY.

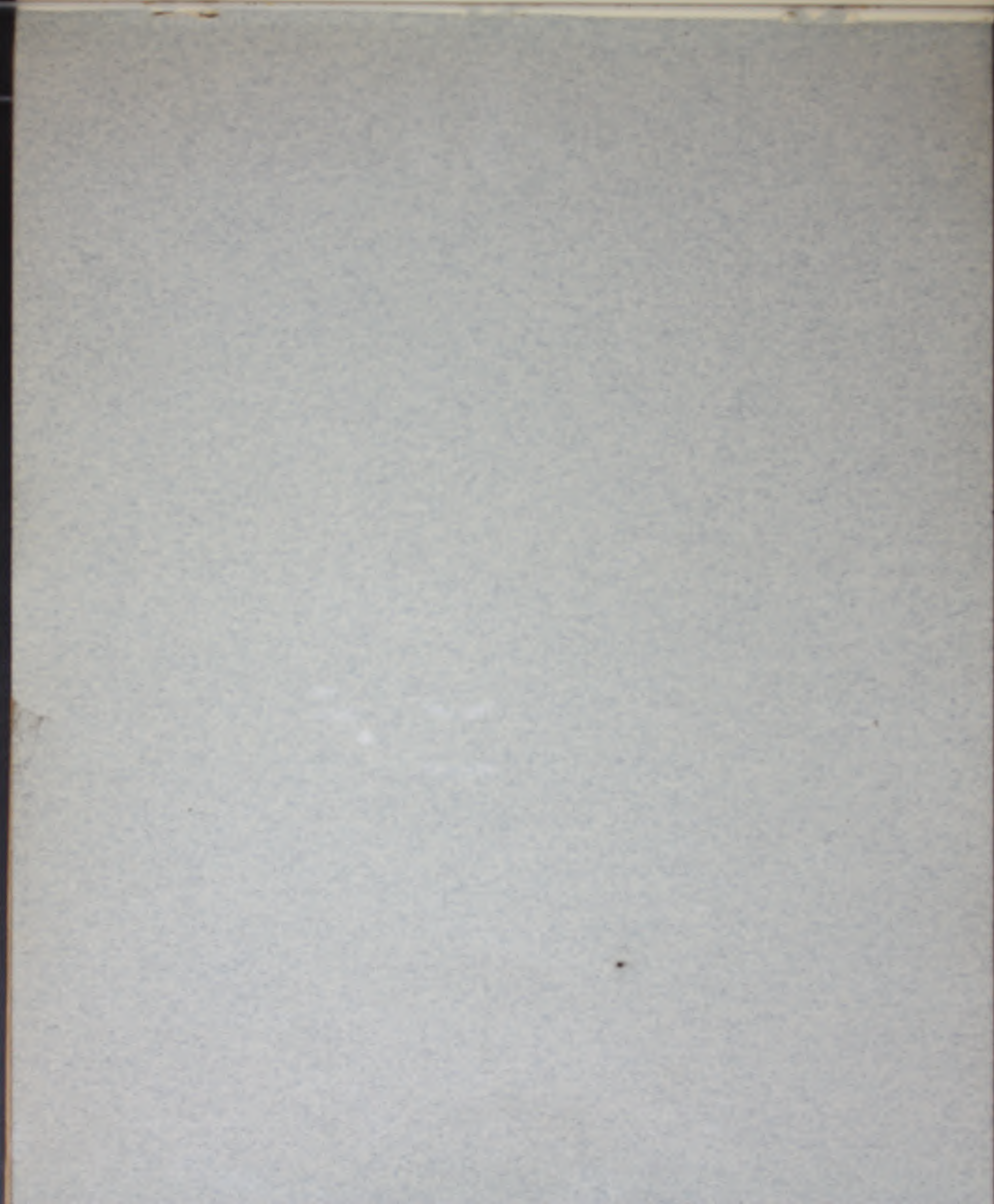
General Agents.

Pittsburgh, Pa., October 22, 1887.

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